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[54] Title: **CHEWING GUM FOR PREVENTING DROWSINESS**

Specification

1. Title of Invention

Chewing Gum for Preventing Drowsiness

2. Claim

(1) A chewing gum effective against drowsiness, characterized by preparing a gel composition containing caffeine by mixing and dispersing caffeine in a gel composed of one or more types of structural materials selected from groups of hydrated, gelled peptides, polysaccharides, or fibers, and then kneading this composition into a conventional gum base.

(2) The chewing gum according to Claim 1 wherein the content of the caffeine that is mixed and dispersed in the gel composition is 5-50% by weight.

(3) The chewing gum according to Claim 1 wherein the caffeine content is 0.1-3% by weight.

(4) The chewing gum according to Claim 1 wherein the peptide is selected from a group consisting of gelatin, gluten, soy protein, albumin peptides, casein and albumin.

(5) The chewing gum according to Claim 1 wherein the polysaccharide is selected from a group consisting of agar, alginic acid, furcellaran, pectin, starch, xanthan gum, locust bean gum, glucomannan, tamarind seed gum, curdlan-type polysaccharides and carrageenan.

(6) The chewing gum according to Claim 1 wherein the fiber is selected from a group consisting of cellulose, hemicellulose, carboxymethyl cellulose, methyl cellulose, carboxymethyl starch and starch phosphoric acid esters.

(7) The chewing gum according to Claim 1 wherein the caffeine is natural caffeine extracted from raw materials selected from a group consisting of green tea leaves, black tea leaves, maté tea leaves, coffee beans and guarana beans.

(8) The chewing gum according to Claim 1 wherein menthol is the primary flavoring substance of the chewing gum.

(9) The chewing gum according to Claim 1 wherein the gel composition is prepared at temperatures of 150°C or less.

3. Detailed Explanation of the Invention

Field of Industrial Use

The present invention pertains to a drowsiness-preventing chewing gum, and more specifically, it pertains to a drowsiness-preventing chewing gum that contains caffeine—a substance effective in preventing drowsiness because it acts on the brain as a stimulant—in a special form, such that the amount of caffeine added to the gum is great enough to enable it to display this effect and yet small enough to mitigate its bitter flavor, and that the chewing will have appeal as a product.

Prior Art

Caffeine has generally been used in the prior art as an independent substance that is mixed and dispersed in gum to confer to it a drowsiness-preventing effect. However, when a bitter-tasting substance such as caffeine is added by itself to gum, the product loses its appeal because it tastes bitter. Therefore, it has been necessary to reduce the amount of caffeine in gum to such a low level that it loses some of its effectiveness in preventing drowsiness, and the chewer has had to consume a large amount of gum to achieve the desired effect.

It is widely known that caffeine prevents drowsiness by acting as a stimulant to the brain. However, caffeine itself has an extremely bitter taste, and in the case of a food product such as

chewing gum, a relatively small amount of which is consumed at one time, it has been difficult to maintain both a caffeine content high enough to attain this effect and a flavor that appeals to the consumer at the same time.

Problems the Invention Proposes to Solve

The goal of the present invention is to provide a chewing gum that has a high caffeine content yet does not lose its product appeal because the caffeine is premixed and dispersed in a special composition to mitigate its bitterness before being mixed with the chewing gum.

Means of Solving the Problems

The present invention provides a chewing gum effective in preventing drowsiness that is characterized by preparing a gel composition containing caffeine by mixing and dispersing caffeine in a gel composed of one or more structural materials selected from groups of hydrated, gelled peptides, polysaccharides, or fibers, and then kneading this composition into a conventional gum base.

Preferably, the caffeine content mixed and dispersed in the gel composition is 5-50% by weight.

Preferably, the caffeine content of the gum is 0.1-3% by weight.

Preferably, the peptide in the gum is selected from a group consisting of gelatin, gluten, soy protein, albumin peptides, casein and albumin.

Preferably, the polysaccharide in the gum is selected from one group consisting of agar, alginic acid, furcellaran, pectin, starch, xanthan gum, locust bean gum, glucomannan, tamarind seed gum, curdlan and carrageenan.

Preferably, the fiber in the chewing gum is selected from a group consisting of cellulose, hemicellulose, carboxymethyl cellulose, methyl cellulose, carboxymethyl starch and starch phosphoric acid esters.

Preferably, the caffeine in the gum is natural caffeine extracted from raw materials selected from the group consisting of green tea leaves, black tea leaves, maté tea leaves, coffee beans and guarana beans.

Preferably, menthol is the primary flavoring substance of the chewing gum.

Preferably, the gel composition in the gum is prepared at temperatures of 150°C or less.

Action

Chewing gum has traditionally had the effect of immediately overcoming drowsiness because of the chewing activity and the stimulation from substances such as menthol that are added as flavorings. Unfortunately, however, this effect continues for only a short time. Therefore, it has been necessary to add drugs such as caffeine for a long-lasting, sustained effect, and to prevent drowsiness the amount of caffeine consumed at one time must be from 50 to 200 mg. The salient characteristic of the present invention is that the bitter flavor during chewing is mitigated by first mixing and dispersing the intensely bitter caffeine in a blend of various raw materials that can be hydrated and gelled, so that a sufficient amount of caffeine to effectively prevent drowsiness can be added to the gum without causing it to lose its appeal.

If the caffeine content in the gel composition is less than 5%, a considerable amount of the gel composition must be used to add the necessary amount of caffeine to the gum, which means that a large volume of water will be added at the same time, compromising the physical properties of the finished gum, making it soft and difficult to form into an actual product. On the other hand, if the caffeine content surpasses 50%, it is not only difficult to maintain the form of the gel composition,

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but the bitterness of mitigating action is also lost. Therefore, the desirable caffeine content for the gel composition is 15-30%.

Normally, an appropriate amount of caffeine per piece of gum is considered to be 2-7 g, so if the caffeine content is less than 0.1%, the drowsiness-preventing effect is weakened considerably, even when several pieces are consumed one after the other. However, if the caffeine content is greater than 3%, the gum will taste very bitter and no longer be an appealing product, even when the caffeine is added as part of a gel composition. Therefore, when caffeine is added as part of a gel composition, the preferable caffeine content of the gum is 1-2%.

Caffeine is only slightly soluble in water (2-3 g/100 mL of water), but when dispersed in a gel as in the present invention, it can be obtained in a form such that it is encapsulated by the gel. Therefore, it appears that the caffeine that elutes when the caffeine gum is chewed remains in a kind of emulsified state because of the gel, does not dissolve easily in the mouth, and the amount absorbed after the gum is swallowed increases, thereby mitigating the bitterness.

Advantage of the Invention

The present invention provides a chewing gum that has a high caffeine content, yet does not lose its product appeal because the caffeine is premixed and dispersed in a hydrated, gelled composition to mitigate its bitterness, then mixed into the chewing gum.

Embodiments

The present invention is explained in greater detail by the embodiments below, but the present invention is not limited to these embodiments.

Preparation of the Gel Composition Containing Caffeine

Table 1 shows the formula for the preparation of the gel composition in which the caffeine is mixed and dispersed.

Table 1

	Embodiment 1	Embodiment 2	Embodiment 3
Gelatin (B-210)	20 parts	-	10 parts
Agar	-	2 parts	-
Starch	-	-	10
Water	60	78	60
Hydrated caffeine	20	20	20
Totals	100	100	100

Preparation of Caffeine Gum for Drowsiness Prevention

Table 2 shows the formula for the preparation of the caffeine gum for drowsiness prevention.

Table 2

	Embodiment 4	Embodiment 5	Embodiment 6
Gum base	24 parts	24 parts	24 parts
Sugar	60	60	60
Starch syrup	10	10	10
Glycerin	0.5	0.5	0.5
Flavoring (peppermint)	0.5	0.5	0.5
Embodiment 1 composition	5	-	-
Embodiment 2 composition	-	5	-
Embodiment 3 composition	-	-	5
Hydrated caffeine	-	-	-
Totals	100	100	100
	Control 1	Control 2	Control 3
Gum base	24 parts	24 parts	24 parts
Sugar	62	61.5	61
Starch syrup	10	10	10
Glycerin	3.5	3.5	3.5
Flavoring (peppermint)	0.5	0.5	0.5
Embodiment 1 composition	-	-	-
Embodiment 2 composition	-	-	-
Embodiment 3 composition	-	-	-
Hydrated caffeine	-	0.5	1
Totals	100	100	100

Measurement of Drowsiness Prevention and Product Appeal

We tested drowsiness prevention and product appeal of the chewing gum by the following 2 methods.

(1) Amount of Brain Wave Stimulation

We chose 3 males and 3 females between the ages of 20 and 30 years as participants and measured their brain waves after they had consumed a rather large meal in a well-heated room. We attached electrodes at 12 locations on the heads of the participants to detect brain waves and measured the electrical potential. The amount of stimulation was determined by comparing the total electrical potentials of the alpha waves and beta waves.

After measuring the participants' brain waves at rest, we had them each chew 5 g of the chewing gum samples for five minutes. We measured their brain waves immediately after chewing and 10, 20, and 30 minutes after chewing, then compared the results with the original readings of the subjects at rest.

(2) Appeal to the Senses

We chose 5 males between the ages of 20 and 30 years as participants, had them chew 5 g of the chewing gum samples for 5 minutes, and asked them to evaluate the bitterness on a 5-point scale.

Test Results

Table 3 shows the results of brain wave stimulation. The numbers indicate the average values of the 6 participants.

Table 3

	Before Chewing	After Chewing			
	At Rest	Immediately	10 Min	20 Min	30 min
Embodiment 4	100	153	130	110	120
Embodiment 5	100	148	128	108	116
Embodiment 6	100	150	128	110	118
Control 1	100	151	126	105	100
Control 2	100	151	130	106	106
Control 2	100	150	131	112	118

Table 4 shows the results of the sensorial appeal. The evaluation standard was: No bitterness—0 points, slight bitterness—1 point, somewhat bitter—2 points, bitter—3 points, rather bitter—4 points, very bitter—5 points. Three points was the limit for an appealing product.

<p style="text-align: center;">Table 4</p>

	Embodi-ment 4	Embodi-ment 5	Embodi-ment 6	Control 1	Control 2	Control 3
Subject A	1	1	2	0	4	5
Subject B	1	2	2	0	3	4
Subject C	2	2	1	0	3	4
Subject D	1	2	2	0	4	5
Subject E	2	1	1	1	3	4
Average	1.4	1.6	1.6	0.2	3.4	4.4

Based on the above results, we found that the inventive drowsiness-preventing chewing gum is clearly effective because it has a high caffeine content, yet does not lose its product appeal, because the bitter flavor of the caffeine is mitigated.

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